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CURRENT LITERATURE

BOOK REVIEWS

Parasitic seed plants

In order to place at the command of students and teachers the best known methods of growing parasitic seed plants and to encourage the introduction of these hitherto neglected organisms into botanic gardens, HEINRICHER[1] has compiled from his wide experience a manual of explicit directions for the culture of all the better known species. Most of the European and many of the foreign representatives of the Scrophulariaceae, Orobanchaceae, Convolvulaceae, Lauraceae, Santalaceae, Loranthaceae, and Rafflesiaceae are included in his rather extensive list, and in nearly every instance his suggestions are based upon personal experience extending over several years. His previous investigations of the peculiarities in the germination of the seeds of parasites (reviewed in this journal[2]) have been extended, and much valuable data collected on the time required for bringing the parasites to maturity, as well as to the particular host upon which each develops best. While many of these plants may be grown readily in the open ground, pot culture is recommended for others on account of the greater ease with which they may be protected from insects and other enemies. It is found that many of the green hemiparasites are not very exacting in their choice of a host, but in promoting vigorous and rapid development care is often necessary in selecting a host that will not by too vigorous growth exclude the sunlight from the foliage of the parasite. This would indicate that the dependence is here incomplete and that carbohydrates are synthesized by the leaves of the parasite. HEINRICHER, however, does not rely upon this evidence alone to demonstrate that many of the green parasitic seed plants, particularly those of the Rhinanthaceae, obtain only water and nutritive salts from their hosts, but produces what seems to be a most complete line of evidence in support of his contention[3] that photosynthesis continues long after the evolution of the parasitic habit has begun. He presents evidence that the leaves of these plants are highly differentiated morphologically, possess abundant stomata, show a periodicity in their starch content which coincides with the recurrence of daylight and darkness, that locally darkened areas of the leaf blade soon show a deficiency in starch content, and that when the stomata are closed with cocoa butter starch formation does not occur. Further it appears that shoots free from starch soon showed the presence of that substance if placed in sunlight in an atmosphere containing CO_2, but controls, also in sunlight but in an atmosphere without CO_2, showed no starch. Support is also given to the contention that many of these plants receive no carbohydrates from their hosts by the fact that they will thrive as root parasites upon annuals which have no starch or sugar stored in their subterranean organs.—GEO. D. FULLER.

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[1] HEINRICHER, E., Die Aufzucht und Kulture der parasitischen Samenpflanzen. 8vo. pp. 53. Jena: Gustav Fischer. 1910.

[2] BOT. GAZ. **49**:391. 1910.

[3] HEINRICHER, E., Die grünen Halbschmarotzer, VI. Zur Frage nach der assimilatorischen Leistungsfähigkeit der grünen parasitischen Rhineanthaceen. Jahrb. Wiss. Bot. **47**:539–587. 1910.

Phosphorescence in plants

MOLISCH[4] has issued a second and enlarged edition of his work on phosphorescing plants. The book is very simply and interestingly written, and brings up to date his own extensive work in this field as well as the work of all other investigators. The first chapter answers negatively the question "are there phosphorescing algae?", and shows that such appearances are due to light reflection or to animals living on the algae. The second chapter gives the evidence for the existence of phosphorescence in marine Peridineae and for its absence in fresh water forms. The third chapter deals at length with the phenomenon in fungi, both Hyphomycetes and bacteria, and the fourth shows the relation of salts and temperature to the light production in bacteria. The fifth treats of the nutrition, phosphorescing, and growth of the light-producing fungi, and the sixth with the manner in which light is produced. Phosphorescence is an oxidation process demanding a minimal though very small partial pressure of oxygen. There is no convincing evidence for any direct relation between respiration and phosphorescence, much less for the latter being produced by the former. The living cell produces a substance, photogen, which phosphoresces in the presence of water and free oxygen. In the higher fungi and bacteria, in contrast to many animals, the phosphorescing has never been obtained extracellularly. In chapter seven the author gives the spectra and other characters of the light produced by various fungi.

The bacterial light is of sufficient intensity and of proper quality to render photographic work possible by it as the sole source of light. It will cause heliotropic response in various seedlings and fungi, and lead to chlorophyll production, detectable by the spectroscope though not sufficient for visible greening. The light is not capable of penetrating opaque objects, as some workers have probably wrongly claimed for light produced by various animals.

In contrast to the situation with many animals, MOLISCH cannot discover any biological significance of light production in plants. The last chapter

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[4] MOLISCH, HANS, Leuchtende Pflanzen, eine physiologische Studie. viii+193. *pls. 2. figs. 18.* Jena: Gustav Fischer. 1912.